REMARKS

I. Introduction

Claims 1, 3-9, and 11-18 are pending in the present application all of which were rejected. Claim 16 has been amended to recite that R represents the residue of an organic monobasic carboxylic acid which has a boiling point greater than 115°C and an acid value between 50 and 950mg KOH/g. The amendment to claim 16 more clearly defines R, for which recitation of R support can be found, *inter alia*, in claim 8 as originally submitted.

For at least the following reasons, Applicants respectfully submit that the pending claims are patentable, and request that the aforementioned rejections be withdrawn.

II. Objections to the Claims

According to the Examiner claim 16 refers to an organic monobasic carboxylic acid having certain physical properties and also recites a formula for this residue – OC(=O)R'. The Examiner asserts that this limitation is similar, with the exception of the chemical formula, to original claim 8. Further the Examiner asserts that claim 16 uses R', a variable which was not present in the specification as originally filed and which is not explicitly defined in the claim. According to the Examiner, while the words that follow the formula limit the scope of this claim to those monobasic carboxylic acid residues that were encompassed by the limitation of original claim 8, the formula thus does not add new matter as it merely chemically represents what the words alone previously defined. The Examiner suggested to remove the chemically formula and amend the language to more closely match the recitation in original claim 8.

In response applicants have amended claim 16 to remove the chemical formula and recite language more closely matching with the recitation as originally submitted in claim 8 as suggested by the Examiner. For this reason applicants submit that the objection to the claim has been overcome and withdrawal of the objection is respectfully requested.

III. Claim Rejections Under 35 U.S.C. § 103 (a)

Claims 1, 3-5, 8, 9, and 11-18 stand rejected under 35 U.S.C. § 103 (a) as allegedly being unpatentable over Matsuda et al. (US 5,880,173) as set forth on pages 3-5 of the office action. Claims 1, 3-9, and 11-18 stand rejected under 35 U.S.C. § 103 (a) as allegedly being unpatentable over Matsuda et al as applied to claims 1, 3-5, 8, 9, and 11-18 above, and further in view of Hani et al. (US 5,185,033) as set forth on page 6 of the office action.

According to the Examiner Matsuda et al discloses a substrate resin metalized with an organic monobasic acid so that the acid pendant group and organic monobasic acid are both bound to the same metal ion. The Examiner asserts that the organic monobasic acid copper acetate is exemplified and will provide a carboxylic acid group with the salt form –COOCuOAc in which n=1, X= -CO-, M is Cu, R is –OR1 and R1 is a methyl monovalent organic residue. The carboxylic acid monomers can be acrylic or methacrylic acids with an acid number of between 25 to 350 mg KOH/g of solid. The antifouling paint composition comprises the metal-containing resin and an antifouling pigment and/or antifouling agent. According to the Examiner Matsuda et al discloses a list of antifouling agents which includes a number of copper containing biocides such as copper oxides and copper dialkyl dithiocarbamates. The Examiner asserts that Matsuda et al does not explicitly prepare a coating composition with both the metalized polymer and a copper-based biocide. According to the Examiner it would have been obvious to the skilled artisan to incorporate a copper-based biocide such as cuprous oxide in the resin composition. Further the Examiner asserts that it would also be obvious to apply this coating to man-made structures such as fish nets and ships that will be immersed in or exposed to a fouling aquatic environment, thereby protecting the structure from fouling.

With respect to the rejection of the claims over Matsuda et al and further in view of Hani et al, the Examiner asserts that Matsuda et al discloses anti-fouling compositions for various man-made structures comprising a metalized polymer A and an antifouling agent such as cuprous oxide but the cited reference does not disclose the copper biocide copper pyrithione. According to the Examiner Hani et al discloses a paint or paint base composition with enhanced biocidal activity with a biocide of

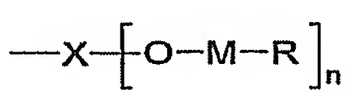
copper pyrithione and cuprous oxide. In addition the Examiner asserts that the paint composition in Hani et al can also contain polymers to thicken the composition, such as various celluloses, poly(vinyl pyrrolidone), or poly(ethylene-glycol) which read on the polymer B of the currently claimed invention. According to the Examiner it would have been obvious to the skilled artisan to use a mixture of copper oxide and copper pyrithione as the biocide in the anti-fouling composition of Matsuda et al.

In response to applicants' previous response the Examiner asserts that the teaching in Matsuda et al. of one of the copper-based biocides as in the currently claimed invention is sufficient to render the claimed invention obvious. Applicants submit however that with respect to cuprous oxide the Examiner mischaracterizes applicants' statement in applicants' previous response regarding whether Matsuda et al. teaches one of the currently claimed copper-based biocides, namely cuprous oxide. Applicants submitted that the copper-based biocide in Matsuda et al. differs from the biocide in the currently claimed invention requiring a copper-based biocide having a metallic copper content below 2% by weight, based on the total weight of the copper-based biocide. In addition, applicants submitted that the cited reference either alone or in combination with Hani et al provides no motivation or guidance to the skilled artisan to reduce the metallic metal content of the copper-based biocide. At least for these reasons the claimed invention is not taught or suggest by Matsuda et al or Matsuda et al in view of Hani et al.

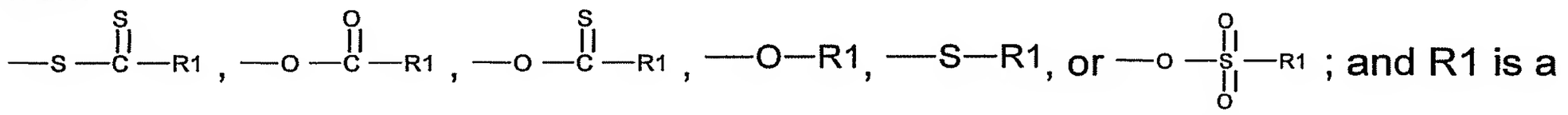
In addition the Examiner asserted that applicants have not provided any evidence that the cuprous oxide in Matsuda et al has a metallic copper content below 2% by weight, based on the total weight of the copper-based biocide. Applicants submit that the attached evidence regarding the elemental copper content of commercially available copper oxides. The attached compilation of Material Safety Data Sheets for Cuprous Oxide, which are dated December 23, 1998; June 24, 2005; December 4, 2006; April 28, 2006, provides that cuprous oxide contains 2% or more of metallic copper. Considering that the metallic copper content in the cuprous oxide composition was not reduced to below 2% by weight in the period between 1998-2006, the cuprous oxide in Matsuda et al differs from the cuprous oxide as in the claimed invention and the skilled artisan would not be motivated to provide cuprous oxide with a lower amount of metallic copper as required in the currently claimed

invention. For at least these reasons alone, the cited reference(s) fail to teach or suggest the currently claimed invention as contrary to the Examiner's assertions Matsuda et al fails to teach or suggest all of the elements of the claimed invention and Hani et al do not cure the deficiencies in the teachings of Matsuda et al. Thus, even if combined with Hani et al the cited references as applied by the Examiner fail to teach or suggest all the elements of the claimed invention.

The currently claimed invention requires an anti-fouling coating composition comprising 20-100 wt%, calculated on the total amount of film-forming components, of a film-forming polymer (A) having an acid number of from 25 to 350mg KOH/g and having an acrylic backbone bearing at least one terminal group of the formula:



wherein X represents  M is Cu, Zn or Te; n is an integer of 1 to 2; R represents an organic residue selected from

 ; and R1 is a monovalent organic residue, and a copper-based biocide for aquatic organisms, said biocide comprising one or more of cuprous oxide, cuprous thiocyanate, cuprous sulphate and copper pyrithione; wherein the copper-based biocide has a metallic copper content below 2% by weight, based on the total weight of the copper-based biocide. As discussed above, contrary to the Examiner's assertions the cited references fail to teach or suggest a copper-based biocide having a metallic copper content below 2% by weight as required in the claimed invention. Further, as previously submitted applicants respectfully submit that these rejections should be withdrawn for at least the following reasons.

Applicants submit the Examiner has incorrectly extrapolated that the cuprous oxide of Matsuda et al. – or for that matter Hani et al. - would have 0% by weight elemental copper, based on the weight of the copper. This level of purity is not, for instance, a feature of any commercial source of cuprous oxide known to the Applicants (see also attached Material Safety Data Sheets). Moreover, with respect to biocidal copper compounds, Matsuda et al. - and for that matter Hani et al. – fail to teach or suggest the importance of reducing the amount of elemental copper impurity to a very low content.

In combination with the specific form of polymer (A), an elemental level of copper of less than 2% in the biocide, as in the currently claimed invention, results in an antifouling composition which combines good, long-term storage-stability in the liquid state (shelf-life) with the ability to perform well in all aqueous environments, irrespective of salinity. See also page 5, 2nd paragraph of the current application. Where the copper based biocide has a metallic copper content of more than 2 wt.%, the advantageous results of the currently claimed invention are not achieved. See for example page 9, lines 25-27 of the current application.

Matsuda et al provides no guidance to the skilled artisan that the level of elemental copper in a biocidal copper compound has an effect on the coating's properties. Applicants submit that in view of Matsuda et al the skilled artisan would not take the metallic copper content into consideration but would instead decide on the type of copper oxide based on rather different properties. As explained on pages 896 and 897 of the Pigments Handbook chapter on Cuprous oxides under "pigment grades", the skilled artisan would select the type of cuprous oxide based on particle size. Particle size is the denoted "result effective variable" not metallic copper content when using such cuprous oxides as biocide in an antifouling coating composition.

For this reason the skilled artisan would not, as a matter of standard procedure, choose a low metallic copper content on the basis that he/she would like the cuprous oxide to be as pure as possible. Low metallic copper containing cuprous oxides are not purer than higher metallic copper-containing cuprous oxides: they contain less metallic copper but more of other impurities. Therefore, contrary to the Examiner's assertions, the skilled artisan would not be motivated to reduce metallic copper content of cuprous oxide for use as a biocide. The nature of the impurities present in the cuprous oxide depends largely on the manufacturing method. Examples of manufacturing methods are electrolysis, oxidation of metallic copper, partial oxidation of copper precipitates, grinding of copper scale and chemical techniques (Pigment Handbook, page 896). Some manufacturing routes inherently produce less metallic copper than others, but those routes concomitantly produce higher contents of chlorides, sulphates, acetone-soluble material and / or metals other than copper. Contrary to the Examiner's assertions it is the resulting lack in

motivation to modify the cuprous oxide in Matsuda et al. that is the basis for applicants' arguments when discussing the concomitantly produced other impurities regardless of whether or not these other impurities are recited in the claimed invention. Accordingly, the copper-based biocide in the form of cuprous oxide as in the claimed invention is a particular type of cuprous oxide the use of which in an antifouling coating composition as in the claimed invention is not taught or suggested by the cited reference.

The skilled artisan reading Matsuda et al as a whole, applying the teachings therein, and seeking to select a cuprous oxide will select the cuprous oxide based on particle size, not purity. However, even if the skilled artisan would like to select on purity, he/she would first have to decide in what respect this cuprous oxide should be pure: in chlorides, sulphates, metallic copper, other metallic elements or in acetone-soluble material. Selecting a cuprous oxide that is pure in one of these respects will be accompanied by higher impurities in other respects. And, since the skilled artisan considering Matsuda et al has no reason to expect an effect of the metallic copper content on the coating's antifouling properties, the skilled artisan is not taught nor has a reason to select a cuprous oxide with a low copper content or reduce the metallic copper content in cuprous oxide for use in the coating compositions as taught in Matsuda et al. This deficiency in the teachings of Matsuda et al is not cured by the teachings of Hani et al because as described above this reference to does not provide any guidance to the skilled artisan to select a copper-based biocide having a metallic copper content below 2% by weight.

Applicants submit that when the skilled artisan considers Matsuda et al in its entirety without applying any hindsight knowledge from the present application surely he would find it completely surprising, and therefore unobvious, that employing a copper-based biocide having a metallic copper content below 2% by weight <u>in combination</u> with polymer (A) in an antifouling coating composition, would lead to much improved results. Therefore, applicants submit that the skilled artisan would not be motivated to modify the teachings of Matsuda et al either in view of the reference alone or in combination with Hani et al to arrive at the currently claimed invention.

Therefore, for at least the preceding reasons, it is respectfully submitted that

claims 1, 3-9, and 11-18 are non-obvious over the cited references. Thus, it is respectfully requested that the rejections of the claims based on these references should therefore be withdrawn.

IV. Conclusion

It is respectfully submitted that the pending claims are now allowable. All issues raised by the Examiner having been addressed, an early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

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Attachments: Material Safety Data Sheet of December 23, 1998 for Cuprous Oxide
Material Safety Data Sheet of June 24, 2005 for Cuprous Oxide
Material Safety Data Sheet of April 12, 2006 for Cuprous Oxide
Material Safety Data Sheet of April 28, 2006 for Cuprous Oxide